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(54) **TAILORING CONTENT TO BE DELIVERED TO MOBILE DEVICE BASED UPON FEATURES OF MOBILE DEVICE**

(58) **Field of Classification Search**
None
See application file for complete search history.

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(56) **References Cited**

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U.S. PATENT DOCUMENTS

6,112,246 A 8/2000 Horbal et al.
6,791,586 B2 9/2004 Baker
(Continued)

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OTHER PUBLICATIONS

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(Continued)

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(57) **ABSTRACT**

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A method, system and computer program product for delivering tailored specific content to a mobile device. A shim application is provided to the mobile device by a content server after the mobile device visits the content server for the first time. The shim application detects the capabilities of the mobile device, such as the screen size, screen resolution, memory size, browser capabilities, etc. The shim application then includes such information in the header of the requests, such as a request for content, sent from the mobile device to the content server. The content server then generates the requested content in the appropriate format based on the information provided in the header. In this manner, the content server will now be able to ensure that the content provided by the content server for a particular mobile device will be appropriately displayed on the mobile device.

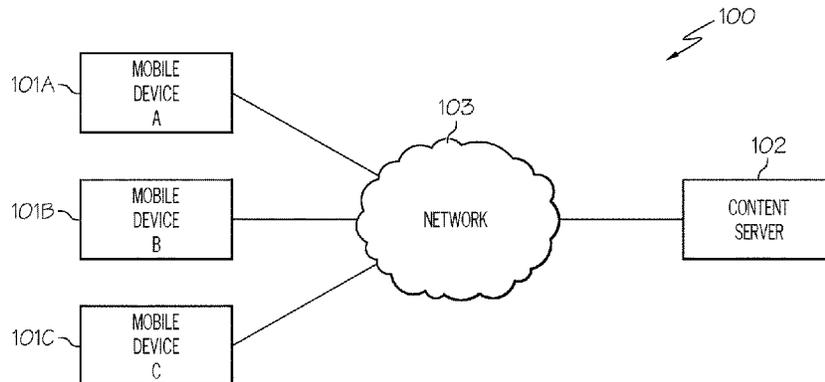
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H04L 29/08 (2006.01)
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(56)

References Cited

U.S. PATENT DOCUMENTS

6,871,236	B2	3/2005	Fishman et al.
7,103,668	B1	9/2006	Corley et al.
7,113,776	B2	9/2006	Minear et al.
7,222,306	B2	5/2007	Kaasila et al.
7,284,061	B2	10/2007	Matsubayashi et al.
7,603,106	B2*	10/2009	Aaltonen G06F 17/30905 455/412.1
7,734,663	B2	6/2010	DeAnna et al.
7,853,593	B2	12/2010	Serdy, Jr. et al.
7,908,315	B2	3/2011	Parkinson
7,911,966	B2	3/2011	Yoo et al.
7,974,988	B2	7/2011	Nandiwada et al.
7,995,994	B2	8/2011	Khetawat et al.
8,081,954	B2	12/2011	Aaltonen et al.
8,099,490	B2	1/2012	Deakin
8,131,875	B1*	3/2012	Chen H04M 1/72522 707/E17.121
8,213,333	B2	7/2012	Greel et al.
8,271,889	B1	9/2012	Beckert et al.
2003/0023427	A1	1/2003	Cassin et al.
2003/0033377	A1	2/2003	Chatterjee et al.
2003/0073440	A1*	4/2003	Mukherjee H04L 29/06 455/435.1
2003/0095135	A1	5/2003	Kaasila et al.
2003/0140089	A1	7/2003	Hines et al.
2003/0210776	A1	11/2003	Sollee et al.
2004/0016002	A1	1/2004	Handelman et al.
2004/0019683	A1*	1/2004	Lee H04L 29/06 709/227
2004/0024867	A1*	2/2004	Kjellberg G06F 17/30905 709/224
2004/0133657	A1	7/2004	Smith et al.
2004/0143656	A1	7/2004	Okada et al.
2004/0153712	A1	8/2004	Owhadi et al.
2004/0203956	A1*	10/2004	Tsampalis H04M 1/72547 455/466
2005/0060381	A1	3/2005	Huynh et al.
2005/0078638	A1	4/2005	Xue et al.
2005/0091311	A1	4/2005	Lund et al.
2005/0096016	A1	5/2005	Tervo et al.
2005/0125506	A1	6/2005	Luciani et al.
2005/0149564	A1	7/2005	Jain et al.
2005/0154787	A1	7/2005	Cochran et al.
2005/0182829	A1*	8/2005	King H04L 29/06 709/220
2006/0067295	A1	3/2006	Lehotsky et al.
2006/0165040	A1	7/2006	Rathod et al.
2006/0168101	A1	7/2006	Mikhailov et al.

2006/0198359	A1	9/2006	Fok et al.
2006/0274869	A1	12/2006	Morse
2006/0282767	A1	12/2006	Suryanarayana et al.
2007/0043848	A1	2/2007	Sing et al.
2007/0183435	A1	8/2007	Kettering et al.
2008/0003991	A1	1/2008	Sievers et al.
2008/0016533	A1	1/2008	Rothschild
2008/0119132	A1*	5/2008	Rao G06Q 30/02 455/3.04
2008/0139112	A1	6/2008	Sampath et al.
2008/0147592	A1	6/2008	Nandiwada et al.
2008/0147862	A1*	6/2008	Chatani H04L 29/06 709/225
2008/0189360	A1	8/2008	Kiley et al.
2008/0192684	A1	8/2008	Tervonen
2008/0222621	A1	9/2008	Knight et al.
2008/0242221	A1	10/2008	Shapiro et al.
2008/0253311	A1	10/2008	Jin
2008/0263139	A1	10/2008	Martin
2008/0298447	A1	12/2008	Yoo et al.
2008/0305775	A1*	12/2008	Aaltonen G06F 17/30905 455/412.1
2008/0313210	A1	12/2008	Cooperstein et al.
2009/0063267	A1	3/2009	Dubinko et al.
2009/0149162	A1	6/2009	Tenny
2009/0150553	A1	6/2009	Collart et al.
2009/0177770	A1	7/2009	Jeong et al.
2009/0203388	A1*	8/2009	Karaoguz H04W 4/02 455/456.3
2009/0213771	A1	8/2009	Celentano et al.
2009/0219920	A1	9/2009	Brandstatter
2009/0233587	A1	9/2009	Muhonen et al.
2009/0265763	A1	10/2009	Davies et al.
2009/0275348	A1*	11/2009	Weinreich G01S 5/0036 455/456.3
2009/0300685	A1*	12/2009	Easter H04N 7/147 725/62
2010/0064324	A1	3/2010	Jenkin et al.
2010/0107146	A1	4/2010	Wrighton et al.
2010/0121975	A1	5/2010	Sinha et al.
2010/0153583	A1*	6/2010	Harris G06F 17/30905 709/246
2010/0174607	A1	7/2010	Henkin et al.
2010/0191835	A1	7/2010	Mehta et al.
2010/0223324	A1	9/2010	Kawai
2010/0271992	A1	10/2010	Wentink et al.
2010/0273462	A1*	10/2010	Thorn H04W 8/26 455/414.1
2010/0299338	A1	11/2010	Aami et al.
2011/0045847	A1	2/2011	Roin et al.
2011/0093340	A1*	4/2011	Kramer G06Q 30/02 705/14.58
2011/0161409	A1	6/2011	Nair et al.
2011/0208822	A1	8/2011	Rathod
2012/0158396	A1	6/2012	Douceur et al.
2012/0206259	A1	8/2012	Gassaway
2013/0031198	A1	1/2013	Jemiolo et al.
2013/0070655	A1	3/2013	Nishida et al.
2014/0101284	A1*	4/2014	Maddimsetty H04W 4/18 709/217
2014/0143087	A1	5/2014	Ahn et al.
2014/0181193	A1*	6/2014	Narasimhan H04L 67/306 709/204

OTHER PUBLICATIONS

Hyvarinen, Tuuli, "Browsing and Navigating Web Applications with Mobile Devices," University of Jyvaskyla, Master's Thesis in Information Systems Science, Dec. 14, 2004, pp. 1-115.

Fu et al., "A Framework for Device Capability on Demand and Virtual Device User Experience," IBM Journal Research and Development, vol. 48, No. 5/6, Sep./Nov. 2004, pp. 635-648.

Mahmoud et al., "Toward a Framework for the Discovery and Acquisition of Mobile Applications," ICMB-GMR 9th Inter. Conf. on Jun. 13-15, 2010, pp. 58-65.

(56)

References Cited

OTHER PUBLICATIONS

Cheng et al., "A Novel Design of Behavioral Analysis Capability in Mobile SNS," ICCTA IEEE Inter. Conf. on Oct. 16-18, 2009, pp. 907-913.

Office Action for U.S. Appl. No. 15/212,443 dated Apr. 21, 2017, pp. 1-18.

Office Action for U.S. Appl. No. 15/212,443 dated Jul. 3, 2017, pp. 1-9.

* cited by examiner

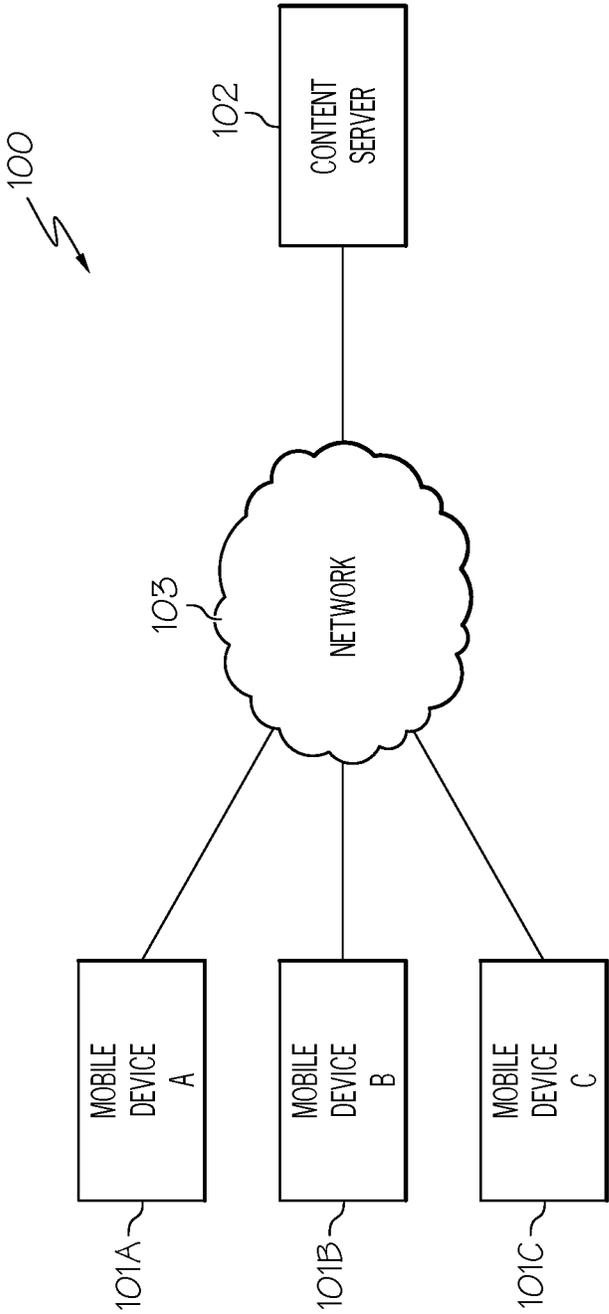


FIG. 1

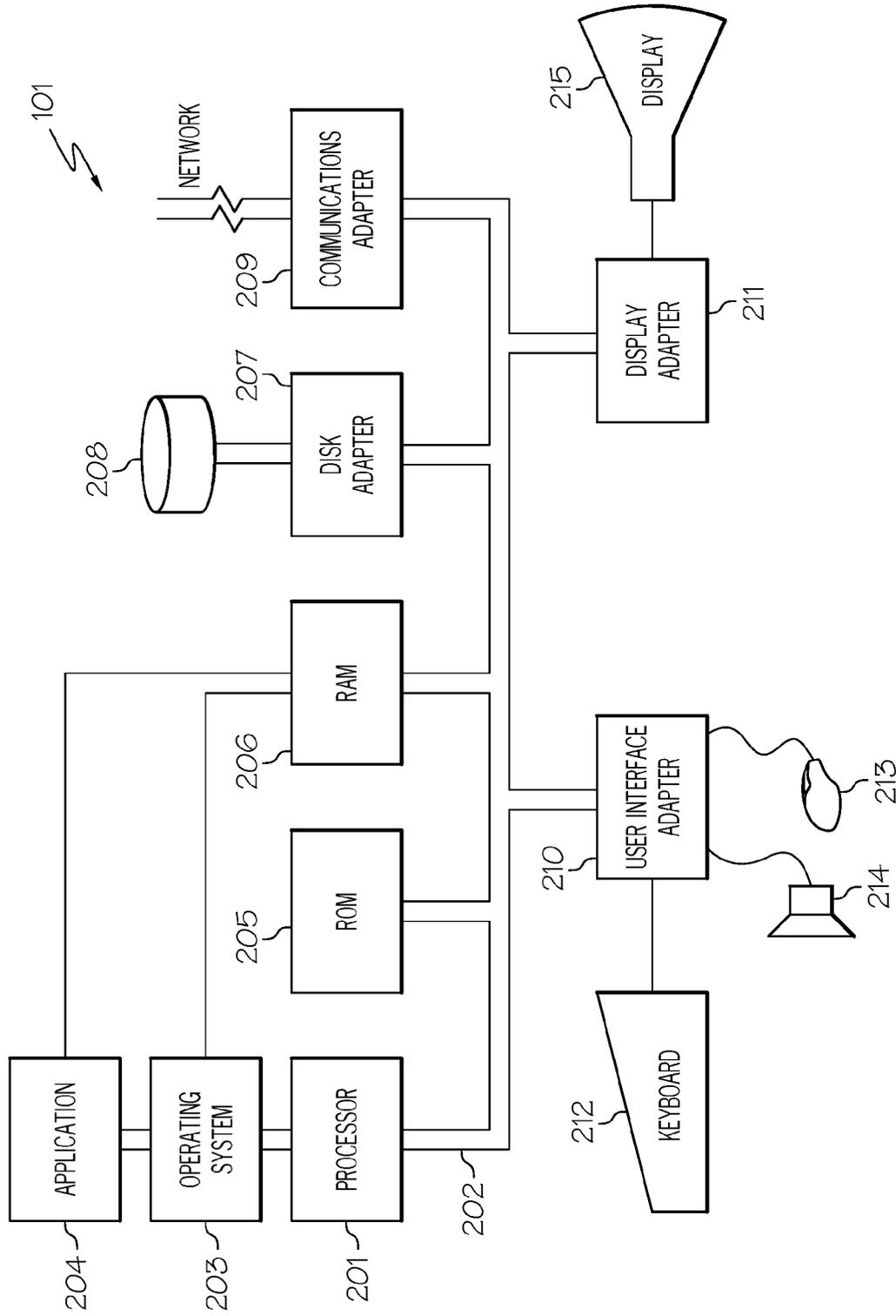


FIG. 2

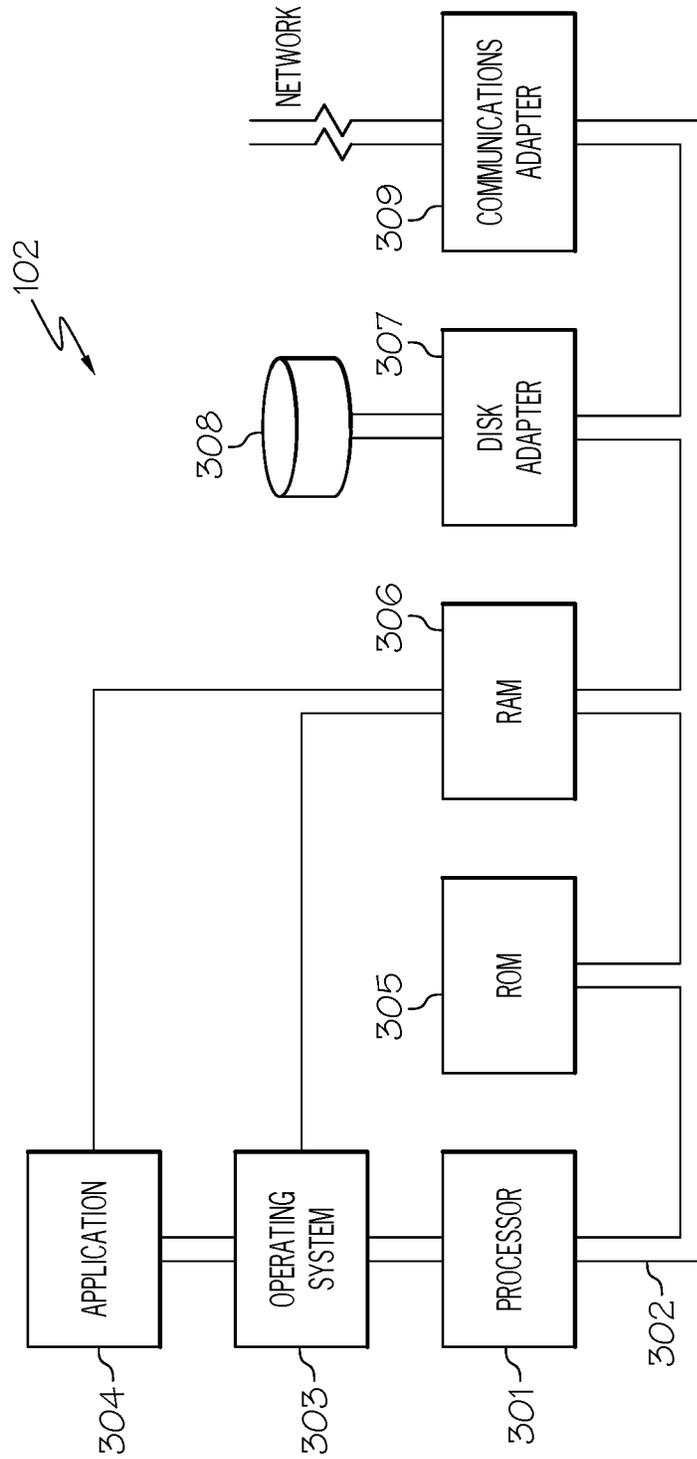


FIG. 3

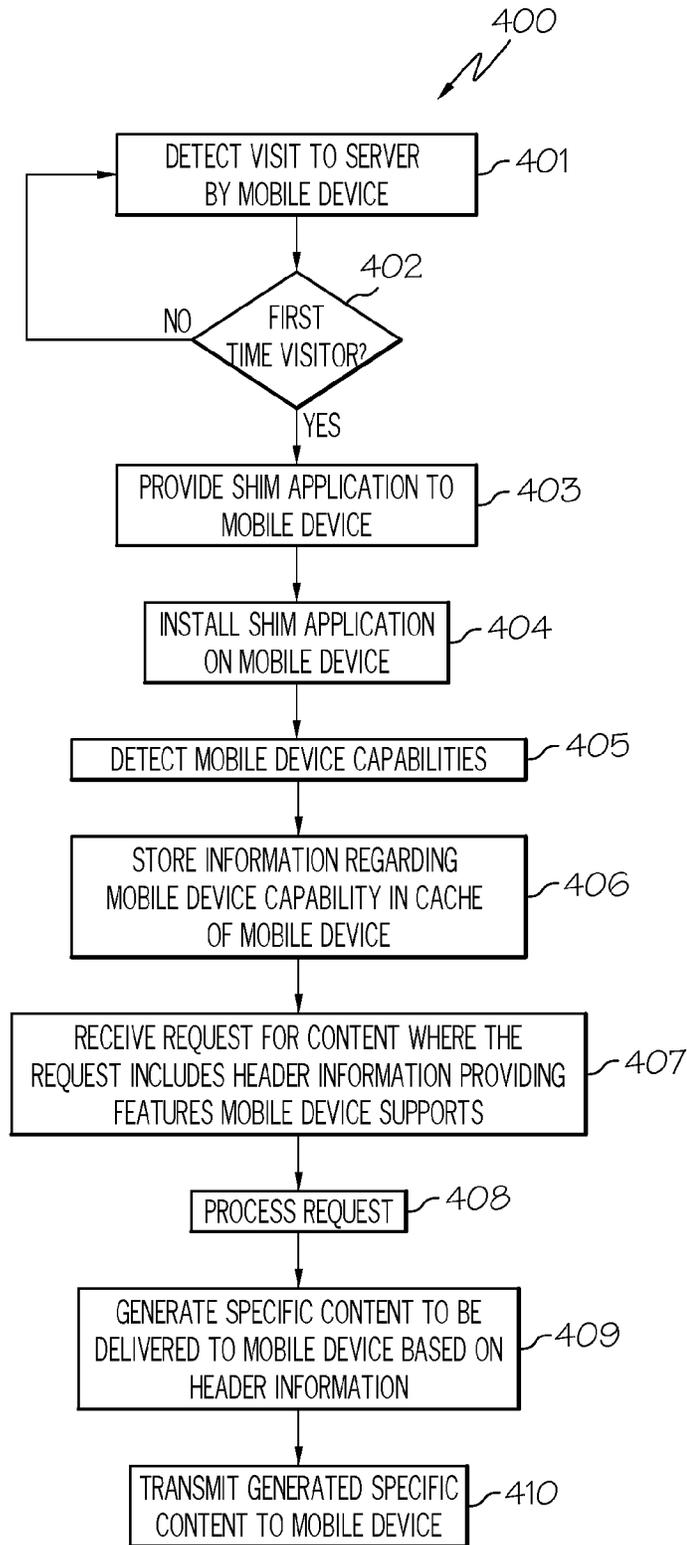


FIG. 4

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TAILORING CONTENT TO BE DELIVERED TO MOBILE DEVICE BASED UPON FEATURES OF MOBILE DEVICE

TECHNICAL FIELD

The present invention relates to mobile communications, and more particularly to tailoring the content delivered to a mobile device based upon the features of the mobile device.

BACKGROUND

In the marketplace, there are currently numerous different types of mobile devices. Mobile devices include mobile or cellular phones, smart phones, personal digital assistants (“PDAs”), palmtop computers, laptop computers and the like. These mobile devices function as wireless communication devices via a wireless communication link (GSM, GPRS, 3G, CSMA and the like) and access content over a wireless network infrastructure.

Each of these mobile devices may include different variations and features, such as web browser(s), as part of their platform. As a result, there may be difficulty in delivering content in an appropriate format to a great number of these mobile devices due to their varying features, such as varying mobile web browsers. For example, the content may not be able to be rendered appropriately on some of these mobile devices since the content provider may not be transmitting content in a format compliant with their web browsers.

The World Wide Web Consortium (“W3C”) has attempted to address this problem by adopting the Composite Capabilities/Preference Profile (“CC/PP”). The CC/PP is a specification for defining capabilities and preferences of user agents, where a user agent may refer to a client application implementing a network protocol used in communications within a client-server distributed computing system. With the CC/PP, a repository is created that maps the user agent to a set of features that are supported for that mobile device. However, the repository must be constantly updated in order to ensure that the mapping is up-to-date.

An additional attempt to address the difficulty in delivering content in an appropriate format to a great number of mobile devices with varying features is to have the mobile devices contain all of the possible libraries for the various mobile browser vendors thereby ensuring that the content is rendered on the mobile device appropriately. However, requiring the mobile devices to contain all of the possible libraries for the various mobile browser vendors is burdensome. Furthermore, the libraries would constantly need to be updated to ensure they are up-to-date.

Hence, there has not been an effective solution to delivering content in an appropriate format to a great number of mobile devices due to their varying features, such as varying mobile web browsers.

SUMMARY

In one embodiment of the present invention, a method for delivering tailored specific content to a mobile device comprises providing a shim application to the mobile device, where the shim application detects capabilities of the mobile device. The method further comprises receiving a request for content, where the request comprises header information providing the capabilities of the mobile device. Additionally, the method comprises generating the content in a format compliant to the mobile device based on the header infor-

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mation. In addition, the method comprises transmitting, by a processor, the generated content to the mobile device.

Other forms of the embodiment of the method described above are in a system and in a computer program product.

The foregoing has outlined rather generally the features and technical advantages of one or more embodiments of the present invention in order that the detailed description of the present invention that follows may be better understood. Additional features and advantages of the present invention will be described hereinafter which may form the subject of the claims of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention can be obtained when the following detailed description is considered in conjunction with the following drawings, in which:

FIG. 1 illustrates an embodiment of the present invention of a network system;

FIG. 2 illustrates a hardware configuration of a mobile device in accordance with an embodiment of the present invention;

FIG. 3 illustrates a hardware configuration of a content server in accordance with an embodiment of the present invention; and

FIG. 4 is a flowchart of a method for delivering tailored specific content to a mobile device in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

The present invention comprises a method, system and computer program product for delivering tailored specific content to a mobile device. In one embodiment of the present invention, a shim application is provided to the mobile device by a content server after the mobile device visits the content server for the first time. The shim application detects the capabilities of the mobile device, such as the screen size, screen resolution, memory size, browser capabilities, etc. The shim application then includes such information in the header of the requests, such as a request for content, sent from the mobile device to the content server. The content server then generates the requested content in the appropriate format based on the information provided in the header. In this manner, the content server will now be able to ensure that the content provided by the content server for a particular mobile device will be appropriately displayed on the mobile device.

In the following description, numerous specific details are set forth to provide a thorough understanding of the present invention. However, it will be apparent to those skilled in the art that the present invention may be practiced without such specific details. In other instances, well-known circuits have been shown in block diagram form in order not to obscure the present invention in unnecessary detail. For the most part, details considering timing considerations and the like have been omitted inasmuch as such details are not necessary to obtain a complete understanding of the present invention and are within the skills of persons of ordinary skill in the relevant art.

Referring now to the Figures in detail, FIG. 1 illustrates a network system **100** configured in accordance with an embodiment of the present invention. Network system **100** includes mobile devices **101A-101C** (identified as “Mobile Device A,” “Mobile Device B,” and “Mobile Device C,” respectively, in FIG. 1). Mobile devices **101A-101C** may collectively or individually be referred to as mobile devices

101 or mobile device **101**, respectively. Mobile device **101** may be any mobile computing device, including, but not limited to, a mobile phone, a cellular phone, a smart-phone, a personal digital assistance (PDA), a gaming unit, a portable computing unit, tablet personal computer, and the like. System **100** may include any number of mobile devices **101** and the depiction of three mobile devices **101A-101C** in FIG. **1** is for illustrative purposes. A description of one embodiment of the hardware configuration of mobile device **101** is provided below in connection with FIG. **2**.

Mobile devices **101** are in wireless communication with a content server **102** via a network **103**, which may be, for example, a wireless wide area network, a circuit-switched telephone network, a Global System for Mobile Communications (GSM) network, Wireless Application Protocol (WAP) network, a WiFi network, an IEEE 802.11 standards network, various combinations thereof, etc. Other networks, whose descriptions are omitted here for brevity, may also be used in conjunction with system **100** of FIG. **1** without departing from the scope of the present invention.

Content server **102** is configured to receive and provide services and information to mobile devices **101**. In particular, content server **102** is configured to receive a request for content from mobile device **101** and to ensure that the content is formatted in a format compliant for mobile device **101** based on header information provided by a shim application as discussed further below. A description of one embodiment of the hardware configuration of content server **102** is provided below in connection with FIG. **3**.

While FIG. **1** illustrates a single server **102**, the principles of the present invention are not so constrained. For example, content may be served from a plurality of content servers, including a content server farm, a distributed server architecture, and the like, without departing from the scope and spirit of the described embodiments.

Referring now to FIG. **2**, FIG. **2** illustrates a hardware configuration of mobile device **101** which is representative of a hardware environment for practicing the present invention. Referring to FIG. **2**, mobile device **101** has a processor **201** coupled to various other components by system bus **202**. An operating system **203** runs on processor **201** and provides control and coordinates the functions of the various components of FIG. **2**. An application **204** in accordance with the principles of the present invention runs in conjunction with operating system **203** and provides calls to operating system **203** where the calls implement the various functions or services to be performed by application **204**. Application **204** may include, for example, a browser, an application shim provided by content server **102** (FIG. **2**) used to detect the capabilities (e.g., screen size, screen resolution, memory size, browser capabilities) of mobile device **101**, as discussed further below in association with FIG. **4**.

Referring again to FIG. **2**, read-only memory (“ROM”) **205** is coupled to system bus **202** and includes a basic input/output system (“BIOS”) that controls certain basic functions of mobile device **101**. Random access memory (“RAM”) **206** and disk adapter **207** are also coupled to system bus **202**. It should be noted that software components including operating system **203** and application **204** may be loaded into RAM **206**, which may be mobile device’s **101** main memory for execution. Disk adapter **207** may be an integrated drive electronics (“IDE”) adapter that communicates with a disk unit **208**, e.g., disk drive.

Mobile device **101** may further include a communications adapter **209** coupled to bus **202**. Communications adapter

209 interconnects bus **202** with an outside network (network **103**) thereby enabling mobile device **101** to communicate with content server **102**.

I/O devices may also be connected to mobile device **101** via a user interface adapter **210** and a display adapter **211**. Keyboard **212**, mouse **213** and speaker **214** may all be interconnected to bus **202** through user interface adapter **210**. Data may be inputted to mobile device **101** through any of these devices. A display monitor **215** may be connected to system bus **202** by display adapter **211**. In this manner, a user is capable of inputting to mobile device **101** through keyboard **212** or mouse **213** and receiving output from mobile device **101** via display **215** or speaker **214**.

As stated above, FIG. **3** illustrates a hardware configuration of a content server **102** (FIG. **1**) which is representative of a hardware environment for practicing the present invention. Referring to FIG. **3**, content server **102** has a processor **301** coupled to various other components by system bus **302**. An operating system **303** runs on processor **301** and provides control and coordinates the functions of the various components of FIG. **3**. An application **304** in accordance with the principles of the present invention runs in conjunction with operating system **303** and provides calls to operating system **303** where the calls implement the various functions or services to be performed by application **304**. Application **304** may include, for example, a program for delivering tailored specific content to mobile device **101**, as discussed further below in association with FIG. **4**.

Referring again to FIG. **3**, read-only memory (“ROM”) **305** is coupled to system bus **302** and includes a basic input/output system (“BIOS”) that controls certain basic functions of content server **102**. Random access memory (“RAM”) **306** and disk adapter **307** are also coupled to system bus **302**. It should be noted that software components including operating system **303** and application **304** may be loaded into RAM **306**, which may be content server’s **102** main memory for execution. Disk adapter **307** may be an integrated drive electronics (“IDE”) adapter that communicates with a disk unit **308**, e.g., disk drive. It is noted that the program for delivering tailored specific content to mobile device **101**, as discussed further below in association with FIG. **4**, may reside in disk unit **308** or in application **304**.

Content server **102** may further include a communications adapter **309** coupled to bus **302**. Communications adapter **309** interconnects bus **302** with an outside network (network **103**) thereby allowing content server **102** to communicate with mobile devices **101**.

The present invention may be a system, a method, and/or a computer program product. The computer program product may include a computer readable storage medium (or media) having computer readable program instructions thereon for causing a processor to carry out aspects of the present invention.

The computer readable storage medium can be a tangible device that can retain and store instructions for use by an instruction execution device. The computer readable storage medium may be, for example, but is not limited to, an electronic storage device, a magnetic storage device, an optical storage device, an electromagnetic storage device, a semiconductor storage device, or any suitable combination of the foregoing. A non-exhaustive list of more specific examples of the computer readable storage medium includes the following: a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a static random access memory (SRAM), a portable compact disc read-only memory (CD-

ROM), a digital versatile disk (DVD), a memory stick, a floppy disk, a mechanically encoded device such as punch-cards or raised structures in a groove having instructions recorded thereon, and any suitable combination of the foregoing. A computer readable storage medium, as used herein, is not to be construed as being transitory signals per se, such as radio waves or other freely propagating electromagnetic waves, electromagnetic waves propagating through a waveguide or other transmission media (e.g., light pulses passing through a fiber-optic cable), or electrical signals transmitted through a wire.

Computer readable program instructions described herein can be downloaded to respective computing/processing devices from a computer readable storage medium or to an external computer or external storage device via a network, for example, the Internet, a local area network, a wide area network and/or a wireless network. The network may comprise copper transmission cables, optical transmission fibers, wireless transmission, routers, firewalls, switches, gateway computers and/or edge servers. A network adapter card or network interface in each computing/processing device receives computer readable program instructions from the network and forwards the computer readable program instructions for storage in a computer readable storage medium within the respective computing/processing device.

Computer readable program instructions for carrying out operations of the present invention may be assembler instructions, instruction-set-architecture (ISA) instructions, machine instructions, machine dependent instructions, microcode, firmware instructions, state-setting data, or either source code or object code written in any combination of one or more programming languages, including an object oriented programming language such as Smalltalk, C++ or the like, and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The computer readable program instructions may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider). In some embodiments, electronic circuitry including, for example, programmable logic circuitry, field-programmable gate arrays (FPGA), or programmable logic arrays (PLA) may execute the computer readable program instructions by utilizing state information of the computer readable program instructions to personalize the electronic circuitry, in order to perform aspects of the present invention.

Aspects of the present invention are described herein with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems), and computer program products according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer readable program instructions.

These computer readable program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus,

create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. These computer readable program instructions may also be stored in a computer readable storage medium that can direct a computer, a programmable data processing apparatus, and/or other devices to function in a particular manner, such that the computer readable storage medium having instructions stored therein comprises an article of manufacture including instructions which implement aspects of the function/act specified in the flowchart and/or block diagram block or blocks.

The computer readable program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other device to cause a series of operational steps to be performed on the computer, other programmable apparatus or other device to produce a computer implemented process, such that the instructions which execute on the computer, other programmable apparatus, or other device implement the functions/acts specified in the flowchart and/or block diagram block or blocks.

The flowchart and block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods, and computer program products according to various embodiments of the present invention. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of instructions, which comprises one or more executable instructions for implementing the specified logical function(s). In some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts or carry out combinations of special purpose hardware and computer instructions.

As stated in the Background section, mobile devices may include different variations and features, such as web browser(s), as part of their platform. As a result, there may be difficulty in delivering content in an appropriate format to a great number of these mobile devices due to their varying features, such as varying mobile web browsers. For example, the content may not be able to be rendered appropriately on some of these mobile devices since the content provider may not be transmitting content in a format compliant with their web browsers. Currently, there has not been an effective solution to delivering content in an appropriate format to a great number of mobile devices due to their varying features, such as varying mobile web browsers.

The principles of the present invention provide an improved technique for delivering content in an appropriate format to various mobile devices with varying platforms by having the content server deliver specifically tailored content to each mobile device as discussed below in connection with FIG. 4. FIG. 4 is a flowchart of a method for delivering tailored specific content to a mobile device.

As stated above, FIG. 4 is flowchart of a method for delivering tailored specific content to a mobile device **101** (FIGS. 1 and 2) in accordance with an embodiment of the present invention.

Referring to FIG. 4, in conjunction with FIGS. 1-3, in step **401**, content server **102** detects a visit to server **102** by mobile device **101**.

In step 402, a determination is made by server 102 as to whether the visit by mobile device 101 is a first time visit. If the visit is not a first time visit, then content sever 102 continues to monitor a visit by a subsequent mobile device 101 in step 401.

If, however, content server 102 detects a first time visit by mobile device 101, then, in step 403, content server 102 provides a shim application to mobile device 101. A shim application refers to a small library which transparently intercepts an application programming interface of mobile device 101, changes the parameters passed, handles the operation itself or redirects the operation elsewhere. "Providing the shim application," as used herein, includes any means for the shim application to be provided to mobile device 101, including having content server 102 directly transmit the shim application to mobile device 101 as well as having content server 102 transmit a link to a website to download the shim application. In one embodiment, the shim application will be specific to mobile device 101 and will act as a client side proxy application. In one embodiment, the shim application will be configured as part of the installation.

In step 404, the user of mobile device 101 installs the shim application on mobile device 101. Once installed, in step 405, the shim application will detect the capabilities of mobile device 101. For example, the shim application can detect one or more of the following capabilities: screen size, screen resolution, memory size, browser capabilities, and the like. This list is not intended to be limiting but to provide examples of information that may be used to determine the capabilities of mobile device 101 so that content server 102 appropriately formats the content to be appropriately displayed on mobile device 101. Embodiments of the present invention cover any such information regarding the capabilities of mobile device 101 that may be used by content server 102 to appropriately format the content to be appropriately displayed on mobile device 101.

In step 406, the information regarding the capabilities of mobile device 101 detected by the shim application is stored in a cache (not shown in FIG. 2) of mobile device 101. The cache may be located internal within processor 201 or located external to processor 201. The cache may be any type of cache (e.g., physically indexed, physically tagged; virtually indexed, virtually tagged; virtually indexed, physically tagged).

In step 407, content server 102 receives a request for content from mobile device 101, where the request includes header information that provides content server 102 with the features or capabilities mobile device 101 supports, such as the capabilities detected in step 405. In one embodiment, the shim application adds the header information to the beginning of the data (i.e., request) being transmitted to content server 102, where the header information is obtained from the cache of mobile device 101.

In step 408, content server 102 processes the request. In step 409, content server 102 generates specific content to be delivered to mobile device 101 based on the received header information thereby ensuring that the content is formatted in a manner so that it will be appropriately displayed on mobile device 101. By content server 102 receiving information regarding the capabilities of mobile device 101 via the header information, content server 102 will now be able to ensure that the content provided by content server 102 for a particular mobile device 101 will be appropriately displayed on mobile device 101.

In step 410, content server 102 transmits the content generated in step 409 to mobile device 101.

In some implementations, method 400 may include other and/or additional steps that, for clarity, are not depicted. Further, in some implementations, method 400 may be executed in a different order presented and that the order presented in the discussion of FIG. 4 is illustrative. Additionally, in some implementations, certain steps in method 400 may be executed in a substantially simultaneous manner or may be omitted.

An example of a program using the principles of the present invention includes a program for generating charts and gauges which can be generated either on the client-side or on the sever-side. The determination as to whether the program generates the charts and gauges on either the client-side or on the server-side can be determined based on the memory capabilities of the mobile device, which is obtained from the shim application.

The descriptions of the various embodiments of the present invention have been presented for purposes of illustration, but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments. The terminology used herein was chosen to best explain the principles of the embodiments, the practical application or technical improvement over technologies found in the marketplace, or to enable others of ordinary skill in the art to understand the embodiments disclosed herein.

The invention claimed is:

1. A computer program product for delivering tailored specific content to a mobile device, the computer program product comprising a computer readable storage medium having program code embodied therewith, the program code comprising the programming instructions for:
 - monitoring accesses on a server for access operation(s) performed by a mobile device to determine a first access operation by the mobile device;
 - responsive to detecting the first access operation, directing a user through a user interface to load an application for the mobile device; and
 - receiving a mobile device capability data set indicative of capabilities of the mobile device that have been determined based upon automatically detecting of capabilities of the mobile device by the application.
2. The computer program product as recited in claim 1, wherein the program code further comprises the programming instructions for:
 - providing, by the server and to the mobile device through a wireless communication network, a user interface data set for implementing the user interface on the mobile device.
3. The computer program product as recited in claim 1, wherein the application includes program instructions programmed to:
 - store the mobile device capability data set in a cache of the mobile device; and
 - communicate, from the mobile device, to the server and through a wireless communication network, the mobile device capability data set.
4. The computer program product as recited in claim 1, wherein the program code further comprises the programming instructions for:
 - receiving, by the server, from the mobile device and through a communications network, a first request;
 - determining, by the server, a first response to the first request, with the first response being based, at least in

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part, upon the mobile device capabilities indicated by the mobile device capability data set.

5 **5.** The computer program product as recited in claim 1, wherein the mobile device capability data set includes at least one of the following types of capability information: geolocation and screen size.

6. The computer program product as recited in claim 1, wherein the mobile device capability data set includes both of the following types of capability information: geolocation and screen size.

7. A server, comprising:

a memory unit for storing a computer program for delivering tailored specific content to a mobile device; and

a processor coupled to the memory unit, wherein the processor is configured to execute the program instructions of the computer program comprising:

15 monitoring accesses for access operation(s) performed by a mobile device to determine a first access operation by the mobile device;

20 responsive to detecting the first access operation, directing a user through a user interface to load an application for the mobile device; and

receiving a mobile device capability data set indicative of capabilities of the mobile device that have been determined based upon automatically detecting of capabilities of the mobile device by the application.

8. The server as recited in claim 7, wherein the program instructions of the computer program further comprise:

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providing, by the server and to the mobile device through a wireless communication network, a user interface data set for implementing the user interface on the mobile device.

9. The server as recited in claim 7, wherein the application includes program instructions programmed to:

store the mobile device capability data set in a cache of the mobile device; and

10 communicate, from the mobile device, to the server and through a wireless communication network, the mobile device capability data set.

10. The server as recited in claim 7, wherein the program instructions of the computer program further comprise:

receiving from the mobile device and through a communications network, a first request;

determining a first response to the first request, with the first response being based, at least in part, upon the mobile device capabilities indicated by the mobile device capability data set.

11. The server as recited in claim 7, wherein the mobile device capability data set includes at least one of the following types of capability information: geolocation and screen size.

12. The server as recited in claim 7, wherein the mobile device capability data set includes both of the following types of capability information: geolocation and screen size.

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